

**NORTH CAROLINA  
LAPIDARY SOCIETY**

**August  
1983**



# Stone Cutter

MEETINGS: *SUNDAY*  
Third ~~Thursday~~ each month.  
GEMCRAFTERS  
2106 Patterson St.  
Greensboro, NC 27407



THERE WILL BE NO MEETINGS OF NCLS  
FOR THE MONTHS OF JULY AND AUGUST.  
THE NEXT MEETING WILL BE SEPT. 18, 1983.

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From THE T-TOWN ROCKHOUND , Tulsa, OK, June, 1983

THE CARE AND FEEDING OF IVORY

by Harvey Shell

Ivory is valuable and, like anything valuable, it should receive the proper care. The following will help you to keep your ivory in top condition.

All ivory contains moisture. When it loses this moisture, it cracks, becomes dull, and eventually decomposes into a dull, chalk-like material. To prevent this, you must return the lost moisture. One way to do this is to keep the ivory in an enclosed space such as a glass display case in which you have placed a small glass of water. The moisture from the water will maintain the moisture level in the ivory. Another method is to rub the ivory with baby oil. This need not be done frequently -- once every six months or once a year should be sufficient. Do not soak the piece in oil -- a light coat is plenty.

Avoid temperature changes as much as possible. Sudden temperature drops can cause cracks in ivory. A severe temperature drop can literally cause ivory to explode. Should you accidentally expose an ivory piece to cold and cracks develop, place the piece in a case with a glass of water. This will sometimes cause the cracks to close. Avoid handling during this time, as dirt from your hands will work into the cracks and cause a black line when the crack closes.

If it becomes necessary to clean an ivory piece, this should be done with warm (not hot), soapy water and a soft, clean cloth. Do not dunk the ivory; instead, wet the cloth and softly rub the piece. After washing, a thin coat of baby oil should be applied.

When working with raw ivory, you will notice a tendency for the ivory to develop cracks in the end grain. This can be prevented, or at least minimized, by coating the raw ends with wax. Shellac or varnish works well also, as does paint, though this last method is not really recommended.

With age, ivory develops a yellowish outer coating known as patina. Many people do not like this patina and wish to remove it. This is unwise as the patina can add to the beauty of the piece and help to prove its age. So, before you decide to try removing the patina (which probably will not be too successful and effort anyway), consider the move very carefully.

Lastly, common sense and careful handling are the best means of caring for ivory. Using these methods, your ivory piece will last for many years and give your great-grandchildren as much pleasure as it gave you.

\* \* \* \* \*

The length of a pearl necklace determines its name... if 18 inches, it is a "Princess"; 20 inches - a "Matinee"; 28 inches - "Opera"; if longer - a "Rope" and if it is so short it stops at the V of the throat it is a "Choker".

from The Geode via Back Benders Gazette

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DRAGON FLY

by Dave Weaver  
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Gulfport, MS 39503

Dear Mr. Ricks

It was with considerable delight that I received the may 1983 issue of "STONE CUTTER". For I am an enthusiastic fan of Long and Steele,s designs. They are,indeed, giants in the field. Their work is monumental,particularly in the use of the tangent ratio.

The design for the S uper Cushion Rectangle (8.034) interested me. I have been interest@d in a modified elliptical equation for some time. When I tried to calculate the girdle outline from the preform and pavilion directions, much to my surprise; the directions given wouldnot generate the outline as shown in the drawing.

Feeling that Long could not be wrong and that my trig must be faulty, I went to the machine. Fortunately, I used a piece of quartz, for thb instructions would not cut the desired outline.

Once a stone is dopped and partially cut I am reluctant to throw it away, so I changed the cut and finished a nice stone. Enclosed arethe cutting instructions and the stone.

Notice that the preform and the first three pavilion cuts are the same as given in 8.034 (Long). The only change I made was to add the two small culet facets. Anxious to finish, I cut the crown in a step cut rather than to take the time to design a more complex crown.

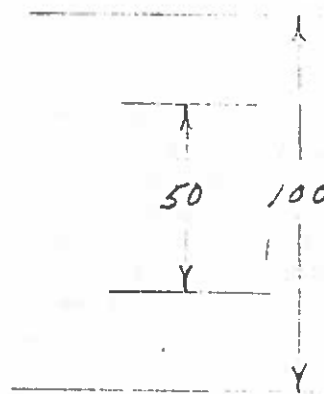
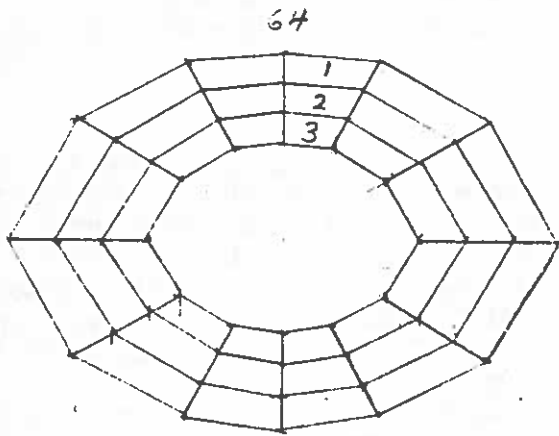
To my surprise the stone was quite nice and upon looking through the table, four large "wings" did show well. Hence the name "DRAGON FLY".

To cut DRAGON FLY use a 64 index and preform as follows:

<u>Step</u>	<u>Angle</u>	<u>Index</u>	<u>Comment</u>
PF1	41.2	63-01-33-31	cut to center
PF2	39.2	59-05-37-27	"
PF3	35.0	53-11-43-21	"
PF4	90.0	63-01-33-31	
PF5	90.0	59-05-37-27	level girdle
PF6	90.0	53-11-43-21	"

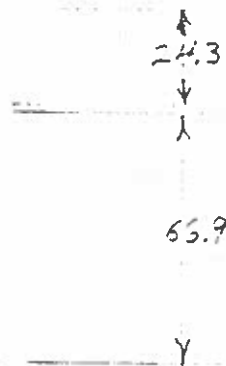
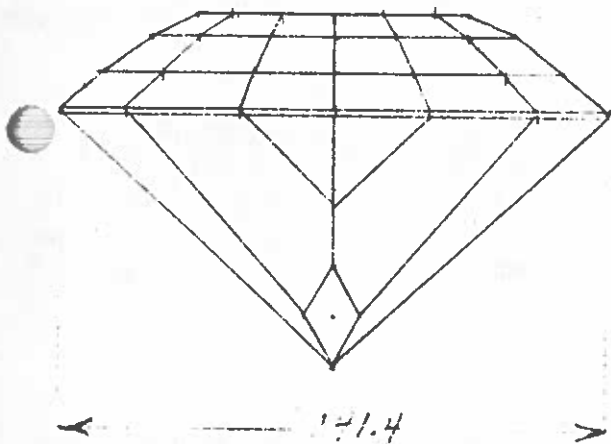
Note: At this point,the distance from the dop to the preform girdle should equal the distance from the girdle to the preform culet. If not cut the stone smaller by repeating steps PF4,5,6.

## C DRAGON FLY, con't.

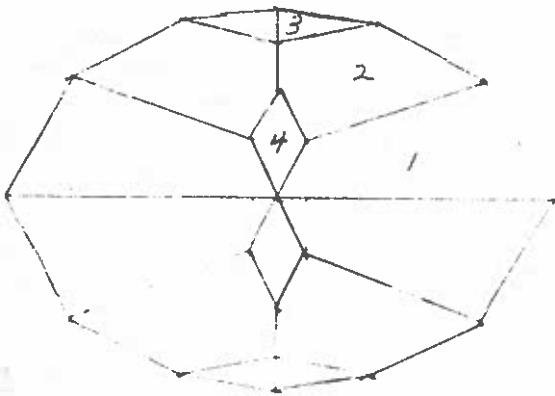
CROWN

STEP	ANGLE	INDEX
C1	50	63-01-33-31
C2	40	59-05-37-27
C3	30	53-11-43-21

NOTE: Same indexing for all three CROWN steps.

PAVILION

STEP	ANGLE	INDEX	COMMENT
P1	47	53-11-43-21	Cut to center.
P2	55	59-05-37-27	Level girdle.
P3	67	63-01-33-31	" "
P4	43	64-32	Cut to center.



### SYNTHETIC GEMS

This is the conclusion of the article on synthetic gems which began in STONE CUTTER, July, 1983. It was copied from the Newsletter of the T. E. R. C. Rocks and Minerals Club.

#### CLASSICAL SYNTHETIC GEMS

**SAPPHIRE (CORUNDUM).** Corundum,  $Al_2O_3$ , was the first synthetic gem to be produced. Pure  $Al_2O_3$  is colorless and is known as white sapphire. The properties of sapphire change radically when it is doped with other cations to produce color. When about 0.1% of the aluminum atoms are replaced by chromium atoms, ruby, of the traditional pigeon-blood red, is the result. Addition of iron and titanium produces the well-known blue sapphire, whereas cobalt yields green sapphire. When up to about 1% titanium oxide is added to  $Al_2O_3$ , it becomes incorporated into the crystal. However, heat-treating or asteration at about  $1200^\circ C$  causes the titanium oxide to precipitate along the six principal crystallographic planes of sapphire's hexagonal structure as elongated needles. When such a crystal is cut into a shape resembling a positive lens (cabochon), the reflection and diffraction of light by these needles produces the well-known asterism in star sapphire. Addition of dopants produces colored stars such as star ruby (Cr) or the black star sapphire.

**SPINEL.** Another easily doped synthetic gem is spinel,  $MgAl_2O_4$ , a colorless crystal of cubic structure. Like sapphire, it is readily doped to produce colors, but since the dopant atoms are at different sites, the colors are different from those resulting from the same ions in sapphire. Blue spinel is produced by the presence of cobalt in the lattice whereas the same ion in sapphire yields a green gem.

**BERYLS (EMERALD).** Beryls are silicates of aluminum and beryllium, eg,  $Be_3Al_2Si_6O_{18}$ . Depending on the doping, the color may range from very pale aquamarine to the lovely green of emerald. Emerald is generally beryl doped with chromium. It is highly colored but has a very low brilliance and fire with a refractive index of about 1.58 and dispersion of 0.014. Its splendid hue more than makes up for these deficiencies. Good stones are usually given an emerald cut to best display the color. Stones vary from bright green with a blue tint to green with a yellow tint. The blue tint is generally more desirable and appears to be caused by small impurities of vanadium.

DIAMOND (See June, 1982, T.E.R.C. ROCKS & MINERALS CLUB NEWSLETTER)

#### DIAMOND SUBSTITUTES

The development of YAG and cubic zirconia ( $ZrO_2$ ) has had a strong impact on the synthetic gemstone industry. The two diamond substitutes developed much earlier were strontium titanate and titanium dioxide. Although the latter two are desirable gemstones in their own right, they are no longer considered as adequate diamond imitations when compared to other recently developed products.

**STRONTIUM TITANATE.** This material,  $SrTiO_3$ , is widely sold under various trade-names; Fabulite and Wellington are perhaps the most widely known. Strontium titanate has very high dispersion and a refractive index (2.41) that is nearly identical to that of diamond (5). These properties cause the stone to be brilliant but excessively fiery. In unprotected settings such as a Tiffany ring, it soon becomes scratched and dulled because of its low hardness. It does not wear very well in any mounting.

**RUTILE.** The refractive index, 2.8, and dispersion, 0.280, of rutile ( $TiO_2$ ) are significantly higher than those of diamond which makes it a very spectacular gem indeed. It is, however, tetragonal in crystalline structure and therefore exhibits double refraction which causes the images of the back facets to appear quite fuzzy. Furthermore, it has never been produced completely water-white or colorless, rather always with a slight straw color. Although  $TiO_2$  is somewhat harder than strontium titanate, it is still too soft for jewelry. For color, the crystal has been produced with several dopants such as Cr for red and Ni for yellow.

## SYNTHETIC GEMS, con't.

YTTRIUM ALUMINUM GARNET (YAG). Yttrium aluminum garnet ( $\text{Y}_3\text{Al}_5\text{O}_{12}$ ) is the best known diamond substitute. It has an acceptable hardness of 8.5, is clear white, and cubic. Its index of refraction (1.82) and dispersion (0.028) are too low for the required brilliance. Nevertheless, it is widely accepted in the marketplace. YAG is grown as a colorless crystal and no postgrowth oxidation is required. Crystals are readily doped to yield colors, the most notable of which is green produced by chromium.

GADOLINIUM GALLIUM GARNET (GGG). Gadolinium gallium garnet ( $\text{Ga}_3\text{Gd}_5\text{O}_{12}$ ) has never been a great commercial success as a gemstone although its properties make it a good diamond substitute, with a refractive index of 2.03, dispersion of 0.038, and hardness of 7. However, the raw materials are very expensive and GGG tends to discolor toward yellow upon exposure to sunlight for prolonged periods.

CUBIC ZIRCONIA. The best of the diamond imitations, cubic zirconia ( $\text{ZrO}_2$ ), has a refractive index of 2.16, dispersion of 0.062, hardness of 8, and is colorless. Zirconia is normally of monoclinic structure at room temperature, but on heating it changes to tetragonal ( $1250^\circ\text{C}$ ), hexagonal (ca  $1900^\circ\text{C}$ ), and finally cubic (ca  $2300^\circ\text{C}$ ). Upon cooling, it reverts to monoclinic. However, addition of yttrium oxide ( $\text{Y}_2\text{O}_3$ ) or calcium oxide ( $\text{CaO}$ ) in amounts of 6-40 mole % stabilizes zirconia and the cubic form can be maintained at room temperature. The very high melting point of  $2750^\circ\text{C}$  prohibits the use of crucibles for Czochralski growth. Therefore, although other methods are possible, the current practice is to use skull melting (or cold crucible) growth. Doping with cerium or chromium gives orange or red crystals, respectively.

(This article was edited from Kirk-Othmer's *ENCYCLOPEDIA OF CHEMICAL TECHNOLOGY*, Third Edition, Volume 11.)

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## TRY WORKING SOME FALSE IVORY

Ask your meat store for some large bones (or save some of your own). Don't cook, just clean off as best you can. Into a large long pan put about  $1\frac{1}{4}$  cups of 20 mule team borax with just enough water to dissolve the borax. Heat to warm temperature, not hot. Put the bones in and soak for three weeks or so. Wash thoroughly and let dry for several days. Household tools will shape bones; you can use round, flat, or pointed files (even fingernail files) and hacksaw and pocket knife will cut. You can sandpaper and finish with steel wool. Or carve, shape, or drill and polish as you would a cab, but it is much easier to work than stone. You can carve flowers or animals on the bone with a Dremel tool.

If you want the darker "mastodon" ivory, soak in strong coffee... The carved areas will turn darker than the rest and stand out beautifully.

Single pieces of polished and decorated bone can be used for pins, rings, pendants, earrings, key chain charms, or scarf slides. Square or oblong links cut from lengthwise strips of bone can be used for bracelets after polishing/decorating by drilling holes in two sides of each link and connecting the links with jumprings and a clasp or by drilling holes through each link and stringing them on round elastic. You can try etching and filling in a design with India ink for bone scrimshaw.

from many Bulletins via ROCKY TRAILS  
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